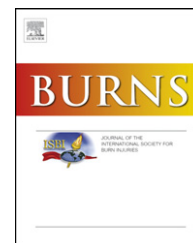


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# A novel, cost effective escharotomy simulator and trainee assessment

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## ABSTRACT

Over the last two decades, virtual reality, haptics, simulators, robotics, and other “advanced technologies” have emerged as important innovations in medical learning and practice. In the 21st century, however, it is important to continue to develop simple teaching aids which are available to large audiences in low and middle-income countries. We present a simple ‘escharotomy simulator’ which has been well received, resulting in an increase in knowledge, and an increase in confidence to carry out the procedure.

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Why should I buy expensive art when I can make my own?

Piero Milani

## 1. Introduction

Over the last two decades, virtual reality, haptics, simulators, robotics, and other “advanced technologies” have emerged as important innovations in medical learning and practice [1]. Such reports on simulator applications in medicine now appear regularly in the medical, computer science, engineering, and popular literature of developed countries. Individuals involved in such developments are to

be encouraged. In the 21st century, however, it is important to continue to develop simple teaching aids which are available to large audiences in low- and middle-income countries.

According to the WHO, 90% of burns occur in developing or underdeveloped nations and 70% of these are in children [2]. The mortality for burns of >40% TBSA approaches 100% in most of these countries [3]. Large burns are more common in these environments, where public health awareness and safety precautions are rudimentary. Improved immediate management of such injuries would significantly improve morbidity and mortality. To this end, we present a simple ‘escharotomy simulator’ which has not been published elsewhere to our knowledge.

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**Fig. 1 – The escharotomy simulator as used on the ‘essential burn case’ course.**

## 2. Technique

A prosthetic arm, normally used as an intravenous cannulation model is wrapped in a thick foam. The foam is compressed circumferentially and wrapped with a piece of pale leather (x cm × x cm) (Fig. 1). In this simple model, the foam acts as oedematous subcutaneous fat, and the leather as the tough full thickness eschar. In a skills station, following a brief didactic session discussing the pathophysiology and indications for escharotomy, the candidate is presented with the pre-prepared ‘arm’. The tactile feedback from the leather simulates a tense full thickness burn. Under aseptic conditions, the candidate uses a scalpel to ‘decompress’ the burn and feel the foam bulging free. In order to assess the usefulness of this model to the candidate, we provided course participants in Karachi, Pakistan ( $n = 32$ ) with a simple questionnaire (see below).

## 3. Results

Previous experience in burn care (years)	Min = 0 Mean = 2.18	Max = 10 S.D. = 3.19
Have you ever seen an escharotomy	Yes = 14	No = 18

Have you ever assisted in an escharotomy	Yes = 8	No = 24
Have you ever done an escharotomy	Yes = 8	No = 24
The following questions have a scale of 1–10 (1 = nothing, 10 = a large amount)		
How much did you learn from this station	Median = 8	Range = 4–10
How useful was the practical explanation	Median = 8.25	Range = 4–10
How confident were you before the station	Median = 5	Range = 1–10
How confident are you after the station	Median = 8	Range = 2–10
Wilcoxon ( $\alpha$ at 0.05, two-tailed)	$z = -4.19$	$p = <0.001$

## 4. Discussion

This novel, simple escharotomy simulator was well received by the candidates, resulting in an increase in knowledge, and an increase in confidence to carry out the procedure (Wilcoxon  $z = -4.19$ ,  $p < 0.001$ ). As instructors on the essential burn care course [4], a course aimed at reducing the morbidity and mortality caused by burn injury in low- and middle-income countries, we found this model to be a useful teaching adjunct. In order to cut costs, one may substitute the prosthetic arm with thick plastic tubing of similar girth, and the leather cuff may be reused by taping the cut ends with thick adhesive tape.

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